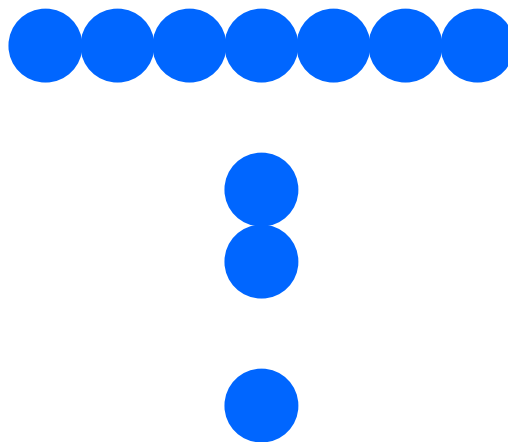




**Department of Agriculture
State of Hawaii**

Economic Impact of the Waiahole Irrigation System



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I. Executive Summary

Agriculture has a long history in Central Oahu, which began with the sugar and pineapple plantations. Seventy-three percent of all agricultural land on the island of Oahu is located in Central Oahu. Due to the characteristics of Leeward Oahu, the sugar industry built an irrigation system, Waiahole Irrigation System, in order to provide water to their crops. Over time, smaller farms and ranches, focusing on diversified agriculture, have emerged utilizing the same irrigation system that the sugar plantations constructed and employed.

Waiahole was and still is a vital component for the agriculture sector. However, since 1995, controversy has emerged over the use of water from Waiahole. Windward parties wish to see the water returned to streams in Windward Oahu, while Leeward farmers require the water to sustain their crops. The Water Commission tried to resolve the dispute through a contested case hearing, but their decisions have resulted in appeals and cross appeals to the State of Hawaii Supreme Court. The dispute still continues today and the appeal is still pending in the Supreme Court.

Another issue surrounding the use of Waiahole water involves the cost of water use. In 1999, the Agricultural Development Corporation (ADC) purchased the Waiahole Irrigation System. The ADC charges a user fee for water from Waiahole, which is used to pay off their debt from the acquisition of the irrigation system. In comparison with state run and privately run irrigation systems, water from state run systems is cheaper than water from Waiahole by approximately \$0.10 per 1,000 gallons. However, water from private irrigation systems can run anywhere from five to eight times as much as

water from state run systems, and four to five times as much as water from Waiahole. If service and meter charges are included, this amount rises substantially.

Agriculture from the Central Oahu region due to water from Waiahole contributes a great deal to Hawaii's economy. About 2,000 jobs have been generated from the agribusinesses that utilize Waiahole water. The Hawaii Department of Agriculture (HDOA) estimates that the combined value of agricultural production by these enterprises is approximately \$95 million annually. This accounts for 51 percent of total crops, livestock, and aquaculture sales recorded by the City and County of Honolulu in 2000. It is estimated that for every \$1 increase in final demand for Hawaii's agriculture, output in Hawaii's economy will increase by \$1.42. When household spending is taken into account, that figure rises to \$1.94.

II. Introduction (history and agricultural development in central Oahu)

Agriculture has a long history in Central Oahu. Although agricultural development began in pre-colonial and colonial Hawaii, growth did not occur in Central Oahu until the rise of the sugar and pineapple industries. Sugar and pineapple were introduced in the early to mid 1800's. As demand these products grew, so did the presence of these industries on the island. For about a hundred-year period (1890-1990), plantation agriculture (sugarcane and pineapples) dominated Central Oahu.

Artesian wells and an irrigation system were built to provide irrigation to these crops. The construction of an irrigation system was necessary due to the characteristics of Leeward Oahu: larger watersheds, lower rainfall and intermittent streamfall. Over time, small ranches and farms were established along these irrigation systems in order to utilize the same water, and as the demise of the sugar and pineapple industries befell Oahu, the growth of other types of agricultural crops emerged.

With Central Oahu having some of the best lands in the state for farming, the presence of diversified agricultural farming has grown. According to the US Geological Survey, roughly 30% of land use on Oahu is classified as agriculture. Approximately 22% of that land is located in Central Oahu. This is more than any other area on the island. The growth of diversified agriculture on the island of Oahu is becoming more popular, due to its close proximity to main markets and the lower cost of shipping in comparison to that of neighbor islands. Today, various types of crops are grown in Central Oahu, and most of the farms in the area rely on the water provided by the irrigation system from the past.

III. Waiahole Irrigation System

History

The Waiahole Irrigation Company (WIC), a subsidiary of Oahu Sugar Company, built the Waiahole irrigation system from February 1913 to December 1916. Additions to the system were made from 1925 to 1933, and again in 1964. The original purpose of the system was to provide irrigation to the sugar cane plantations located on the Leeward side of Oahu, which is a water intensive crop.

The 25.3 mile long water delivery system begins at an elevation of 790ft. in Kahana Valley and ends at a reservoir on the leeward side of Oahu in Honouliuli. The irrigation system is made up of a series of natural dikes and tunnels, which channel impounded ground water. The water from these dikes also feeds three Windward streams in the vicinity, Waiahole, Waikane and Kahana, through seeps and springs. The system uses gravity to transport water through the central plain, and Leeward users of the system pump out the water. A redwood board determines the flow direction and amount.

Depending on which marker the board is raised or lowered to, more or less water flows to leeward or windward areas. If the board is raised, more water flows to the leeward side. Conversely, the more the board is lowered, the greater the amount of water that flows to Waiahole stream. From the time the irrigation system was built up until the early 1990's, the leeward side of Oahu was receiving an average of 27 million gallons of water a day (mgd).

Controversy

Conflict over the Waiahole Irrigation System began when Oahu Sugar announced in 1993 that it would be closing their sugar plantation in 1995. Since the company would no longer need the water from Waiahole, several parties applied to use the water for different purposes, and the question of what to do with the water became a controversial issue.

The two major parties involved in the disagreement were those from the Windward side of Oahu and those from the Leeward side. The organizations from the Windward side wanted the water returned to Windward streams, from which the water was diverted, for several reasons: to restore Waiahole stream, to protect the environment, to preserve native Hawaiian culture and gathering rights, to recharge Kaneohe Bay fishery, and to revive taro farming in Windward valleys. They proposed that the Water Commission do this by way of amending the interim instream flow standards. Those on the Leeward side wanted the water in order to sustain and develop diversified agriculture. They also wanted to utilize the water for other purposes, as well as reserve a portion of the water, which would remain unused, for future purposes.

In the meantime, the involved parties entered a process of mediation to resolve the issue, however they failed to reach an agreement. Thus, the Commission approved a contested case hearing in order to determine how the water should be allocated. Through a temporary six-month agreement that was reached through mediation, 14 mdg were restored to Waiahole Stream. At the expiration of the agreement, the Commission

revised flow amounts and directed 9.4 mgd to flow to the Leeward side and 14.6 mgd be restored to Waiahole Stream.

The contested case hearing opened in November 1995 and after nine months of testimony the Water Commission issued its final decision, which allocated 15.61 mgd to the Leeward side of Oahu and 11.39 mgd to the Windward side. Twenty-four parties were involved in the hearing. Subsequently, appeals and cross appeals were filed to the Supreme Court of the State of Hawaii. Thirty-two months later, on August 22, 2000, the Supreme Court issued its ruling and remanded the case to the Commission so it could review their previous findings. The justices told the Commission to strongly consider the preservation of natural resources as dictated by the public trust doctrine, and to consider several other issues.

In November 2000, the Water Commission appointed a hearing officer, Dr. Lawrence Miike, to the Waiahole Ditch Combined Contested Case Hearing, and after nine months of conducting hearings, he issued his findings. Four months later the Water Commission issued its final decision that ordered the parties involved to receive the following amounts:

- Waiahole Stream, 8.7 mgd
- Waianu Stream, 3.5 mgd
- Waikane Stream, 3.5 mgd
- Kahana Stream, 11.2 mgd
- Robinson Estate, 2.49 mgd
- Nihonkai, 0.48 mgd
- Campbell Estate, 4.74 mgd
- Dole/Castle & Cooke, 2.13 mgd
- Kamehameha Schools, 0.17mgd

Three of the parties have appealed the decision to the State of Hawaii Supreme Court on several issues. The appeal is still pending.

Agricultural Development Corporation (ADC) purchase of the Waiahole System

Established in 1994, the Agricultural Development Corporation's (ADC) objective was to help Hawaii move from the production of predominantly pineapples and sugarcane, to an agricultural industry with more diversity. In order to be able to work efficiently, the State granted the ADC special powers and exemptions. The first order of business for the ADC was the purchase of the Waiahole Irrigation System from Amfac JMB/Hawaii for \$8.5 million in July 1999. The funds used to acquire Waiahole came from the State's sale of revenue bonds. The money generated by user fees from the system would be used to pay the ADC's debt. This would come about through an agreement with the Kunia Water Cooperative.

Kunia Cooperative

In 1999, agricultural water users in Leeward Oahu formed the Kunia Water Cooperative. These water users included national companies, such as Dole, Del Monte, and Garst Seed Company, as well as local agriculture farms, such as Larry Jeffs Farms, Aloun Farms, and roughly 75 other smaller farms. The co-op was formed with the purpose of collectively negotiating on a water rate with the State. The determined rate would have to be beneficial to both parties so that users would pay a competitive rate, and the ADC would be able to repay their debt from those fees. The rational behind providing farmers with an inexpensive source of water was to induce investment in diversified agriculture.

Under the agreement users were charge \$0.35 per 1,000 gallons of water in 1999. As of 2001, users of Waiahole water pay \$0.37 per 1,000 gallons.

Current Status (number of clients and water usage)

Currently, there are 19 users of the Waiahole Irrigation System. Most of the users rely on water from Waiahole for agricultural purposes. However, there are a few customers, such as Mililani Golf Club, Mililani Memorial Park, Pu`u Makakilo Golf Course, and Waiawa Correctional Facility, that utilize the water for other purposes. A complete list of Waiahole Irrigation System users can be found in Appendix A.

IV. Waiahole Water Rates and Statewide Comparison

The rates for agricultural water use across the State of Hawaii can vary substantially depending on what type of system the consumer makes use of. There are two types of systems that are available: state run and private run. The state run systems are managed by the Hawaii Department of Agriculture, through its Agricultural Resource Management Division. There are five irrigations systems, two on Oahu, two on the island of Hawaii, and one on Molokai. The rates and characteristics of each irrigation system are shown in Table 1. Individuals wishing to use the state run irrigation system must apply for irrigation water services by submitting an application to the Hawaii Department of Agriculture.

Table 1. Water rate comparison on State Run Systems

Island	Rate (per 1,000 gallons)	Number of Users	Length (in miles)
Oahu			
Waimanalo	\$0.275	83	15
Kahuku	\$0.32	25	3
Hawaii			
Waimea	\$0.275	83	15
Hamakua	\$0.25	Pending	26
Molokai	\$0.275	180	25

On the other hand, agricultural users of the private run systems pay substantially more for their water. These systems are operated through the Board of Water Supply for each county in the State of Hawaii. Three of the four counties use a block rate system (See Table 2). In order to be eligible for the privatized rates, applicants must submit a written application each fiscal year with proof that the individual is engaged in agriculture.

Table 2. Water rate comparison on Private Run Systems

County	Amount (in gallons)	Rate (per 1,000 gallons)	Additional Charges
Oahu	Block 1: 0-13,000 Block 2: > 13,000	\$2.00 \$0.77	
Kauai	Block 1: 0-25,000 Block 2: > 25,000	\$2.10 \$0.70	Service Charge of \$18 every 2 months
Hawaii		\$1.84 ¹	Monthly meter charge, depending on meter size
Maui	Block 1: 0-10,000 Block 2: 10,001-25,000 Block 3: > 25,000	\$1.42 \$1.91 \$0.76	Monthly meter charge, depending on meter size (See Table 3)

As of 2001, under an agreement with the Kunia Water Cooperative, agricultural users of Waiahole water pay \$0.37 per 1,000 gallons. When compared to users of the state run irrigation systems, Waiahole water users pay more than state water users. Although the

¹ This rate is composed of two charges: water charge of \$0.85 per 1,000 gallons and a power charge of \$0.99 per 1,000 gallons.

per unit cost difference is small, as the amount of water used increases, the total cost difference can become very large.

When comparing rates between the Waiahole Irrigation System and state run systems against privatized systems, there is a substantial price difference. Furthermore, depending on the individual's circumstances, when taking into account other charges, such as service and meter charges, the difference in total cost per month can be as little as \$300.00, (See Table 3). Thus, agricultural water users of private run irrigation systems are placed at a competitive disadvantage.

Table 3. Meter Charge for the County of Maui

<i>Size of Meter</i>	Rate (per meter/per month)
5/8 in	\$5.60
3/4 in	7.00
1 in	11.50
1 1/2 in	22.00
2 in	30.00
3 in	60.00
4 in	110.00
6 in	195.00
8 in	300.00

V. Economic Assessment

The Waiahole irrigation system currently delivers about 10 million gallons per day (mgd) to the Eva Plains to support diversified agriculture. The actual volume fluctuates depending on the time of year and phase in the planting cycle of various crops. Today, Waiahole water irrigates a wide range of crops from pineapple, seed corn, watermelon, tomatoes, bell pepper, onion, cabbage, cucumber, eggplant, basil and others. Some of

these crops such as pineapple, seed corn and basil are primary for exports while others such as watermelon, tomatoes, bell pepper and cabbage are consumed locally.

It is estimated that some 80 agribusinesses in central Oahu subscribe to Waiahole water. These agribusinesses have collectively formed the Kunia Water Cooperative in 1999 to negotiate water rate and delivery terms with the State. Some of the bigger enterprises include Dole Food Company, Del Monte Fresh Produce (Hawaii), Garst Seed Company, Sugarland Farms and Aloun Farms. The Hawaii Agricultural Research Center (HARC) and several ranchers in the area are also members of the cooperative. Non-agriculture users of Waiahole water include the Mililani Golf Course, the Mililani Memorial Park and the Waiawa Correction Facility.

The agribusinesses, which utilize Waiahole water collectively, generate employment to about 2,000 individuals. The combined value of agricultural production by these enterprises is estimated at approximately \$95 million annually by HDOA. This value is significant as it accounts for 51 percent of total crops, livestock and aquaculture sales recorded in the City and County of Honolulu in 2000.

The \$95 million farmgate value generated by agribusinesses, dependent on Waiahole water, can fuel additional economic activities through direct and indirect effects in the overall state economy. A third, induced effect will become more pronounced when households of wage earners are included in the economic assessment. The most recent estimates, released by DBEDT in March 2002, for Type I and Type II output multipliers

for agriculture in Hawaii are 1.42 and 1.94. The Type I multiplier means that every \$1 increase in final demand for Hawaii's agriculture will increase output in the economy by \$1.42. The Type II multiplier is larger because it includes the induced effect of household spending, and hence more widely used in real world applications. In other words, every \$1 increase in final demand for Hawaii's agriculture will increase output in the economy by \$1.94, when household spending is considered.

VI. Acknowledgement

Appendix A: Waiahole Irrigation System users

Aloun Farms
Del Monte Fresh Produce (Hawaii), Inc.
Dole Food Company, Inc.
Garst Seed Company
Hawaii Agricultural Operations
Hawaii Agriculture Research Center
Hawaiian Fertilizer Sales, Inc.
Mililani Golf Club, LLC
Mililani Memorial Park
New Mililani Nursery
Pacific Landscape Corporation
Pu'u Makakilo Golf Course
Sugarland Farms
Waiawa Correctional Facility
Waiawa Nursery
Sueki Yamamoto

Miscellaneous (Ranchers)
Walter Kaluhiokalani
Rodney Santiago